

CLAIMS

What is claimed is:

1. A recombinant expression construct to lower Gly m Bd 30K (Soybean vacuolar protein P34) content of a soybean which comprises a promoter operably linked to an isolated Gly m Bd 30K nucleic acid fragment corresponding substantially to the nucleotide sequence set forth in SEQ ID NO:1 or a functionally equivalent subfragment thereof.

5 2. The recombinant expression construct of Claim 1 wherein the promoter is selected from the group consisting of an  $\alpha$ -subunit beta-conglycinin promoter, a Kunitz Trypsin Inhibitor (KSTI) promoter, a Gly m Bd 28K promoter, T7 promoter, a 35S promoter  
10 and a beta-phaseolin promoter.

15 3. A recombinant expression construct to lower the Gly m Bd 30K (Soybean vacuolar protein P34) content of a soybean which comprises a beta-conglycinin promoter operably linked to an isolated Gly m Bd 30K nucleic acid fragment corresponding substantially to the nucleotide sequence set forth in SEQ ID NO:1 or a functionally equivalent subfragment thereof.

20 4. A recombinant expression construct for producing a hypoallergenic soybean which comprises an isolated KSTI nucleic acid fragment corresponding substantially to the nucleotide sequence set forth in SEQ ID NO:2 or a functionally equivalent subfragment thereof operably linked to an isolated Gly m Bd 28K nucleic acid fragment corresponding substantially to the nucleotide sequence set forth in SEQ ID NO:3 or a functionally equivalent subfragment thereof.

25 5. A hypoallergenic soybean plant comprising in its genome at least one of the expression constructs of any of Claim 1, 2, 3, or 4.

6. The plant of Claim 5 wherein said plant comprises in its genome the expression construct of Claim 3 and 4.

7. Seeds of the plant of Claim 5 or 6.

8. Oil obtained from the seeds of Claim 7.

9. A hypoallergenic soybean product obtained from the plant of Claim 5 or 6.

10. The product of Claim 9 wherein said soybean product is selected from the group 30 consisting of an isolate, a concentrate, meal, grits, full fat and defatted flours, textured proteins, textured flours, textured concentrates and textured isolates.

11. A food which has incorporated therein the product of Claim 9 or 10.

12. A food which has incorporated therein the oil of Claim 8.

13. Products made from the hydrogenation, fractionation, interesterification or 35 hydrolysis of the oil of Claim 8.

14. A blended oil product made with the oil of Claim 8.

15. By-products made during the production of the oil of Claim 8.

16. A method of producing a hypoallergenic soy product from hypoallergenic soybean seeds which comprises:

- cracking the seeds of Claim 7 to remove the meats from the hulls; and
- flaking the meats obtained in step (a) to obtain the desired flake thickness.

5 17. A method for making a hypoallergenic soybean plant which comprises:

- crossing a first parent soybean which is the soybean plant of Claim 3 with a second parent soybean selected from the group consisting of a soybean plant comprising in its genome the recombinant expression construct of claim 4; and

10 (b) selecting progeny plants of the cross of step (a) which are hypoallergenic.

18. A method for making a hypoallergenic soybean plant which comprises:

- crossing a first parent soybean which is a soybean plant comprising in its genome the recombinant expression construct of Claim 3 with a hybrid, mutant or transgenic second soybean parent wherein said second parent is substantially free of one or more allergens selected from the group consisting of Gly m Bd 28K, alpha-subunit of beta-conglycinin, KSTI, Gly m2, Gly m IA, Gly m IB, rGLY m3 and Glycinin G1; and
- selecting progeny plants of the cross of step (a) which are hypoallergenic.

15 19. A method for making a hypoallergenic soybean plant which comprises:

- crossing a first parent soybean which is the soybean plant of Claim 5 with a hybrid, mutant or transgenic second parent soybean wherein the second parent is selected from the group consisting of a soybean plant which is substantially free of the alpha subunit of beta-conglycinin; and
- selecting progeny plants of the cross of step (a) which are hypoallergenic.

20 20. A method for making a hypoallergenic soybean plant which comprises:

- crossing a first parent soybean which is the soybean plant of Claim 5 with a hybrid, mutant or transgenic second parent soybean wherein the second parent which is substantially free of the KSTI allergen; and
- selecting progeny plants of the cross of step (a) which are hypoallergenic.

25 21. A method for making a hypoallergenic soybean plant which comprises:

- crossing a first parent soybean which is the soybean plant of Claim 5 with a hybrid, mutant or transgenic second parent soybean which is substantially free of soybean allergens selected from the group consisting of Gly m Bd 28K, alpha-subunit of beta-conglycinin, KSTI, Gly m2, Gly m IA, Gly m IB, rGLY m3 and Glycinin G1; and
- selecting progeny plants of the cross to step (a) which are hypoallergenic.

30 22. Animal feed which has incorporated therein the product of Claim 9 or 10.

35 23. Animal feed which has incorporated therein the oil of Claim 8.

24. Seeds obtained from a plant made by the method of any of Claim 17, 18, 19, 20 or 21.

25. Oil obtained from the seeds of Claim 24.

26. A hypoallergenic soybean product obtained from a plant made by the method of any of Claim 17, 18, 19, 20 or 21.

5 27. The product of Claim 26 wherein said soybean product is selected from the group consisting of an isolate, a concentrate, meal, grits, full fat and defatted flours, textured proteins, textured flours, textured concentrates and textured isolates.

28. A food which has incorporated therein the product of Claim 26.

10 29. A food which has incorporated therein the product of Claim 27.

30. A food which has incorporated therein the oil of Claim 25.

31. Products made from the hydrogenation, fractionation, interesterification or hydrolysis of the oil of Claim 25.

15 32. A blended oil product made with the oil of Claim 25.

33. By-products made during the production of the oil of Claim 25.

34. A method of producing a hypoallergenic soy product which comprises:

20 (a) cracking the seeds of Claim 24 to remove the meats from the hulls; and

(b) flaking the meats obtained in step (a) to obtain the desired flake thickness.

35. Infant formula which has incorporated therein the product of Claim 9, 10, 26 or 27.

25 36. An isolated nucleic acid fragment comprising a nucleic acid sequence encoding a soybean Gly m Bd 28K protein.

37. An isolated nucleic acid fragment comprising a nucleic acid sequence encoding a soybean Gly m Bd 28K protein with an amino acid identity of 49% or greater to the polypeptide sequence set forth in SEQ ID NO:4 or a functionally equivalent subfragment thereof.

38. The isolated nucleic acid fragment of Claim 37 wherein the amino acid identity is 49% or greater to the polypeptide sequence set forth in SEQ ID NO:4.

39. A plant Gly m Bd 28K protein having an amino acid identity of 49% or greater to the polypeptide sequence set forth in SEQ ID NO:4.

30 40. A chimeric gene comprising the nucleic acid fragment of Claim 36, 37, 38 or 39 or the reverse complement thereof operably linked to regulatory sequences.

41. A hypoallergenic soybean plant comprising in its genome the chimeric gene of Claim 40.

35 42. Seeds of the plant of Claim 41.

43. Oil obtained from the seeds of Claim 42.

44. A hypoallergenic soybean product obtained from the plant of Claim 41.

45. The product of Claim 44 wherein said soybean product is selected from the group consisting of an isolate, a concentrate, meal, grits, full fat and defatted flours, textured proteins, textured flours, textured concentrates and textured isolates.

46. A food which has incorporated therein the product of Claim 44 or 45.

47. A food which has incorporated therein the oil of Claim 43.

48. Products made from the hydrogenation, fractionation, interesterification or hydrolysis of the oil of Claim 43.

49. A blended oil product made with the oil of Claim 43.

50. By-products made during the production of the oil of Claim 43.

51. Animal feed which has incorporated therein the product of Claim 44 or 45.

52. Animal feed which has incorporated therein the oil of Claim 43.

53. Infant formula which has incorporated therein the product of Claim 44 or 45.

54. A method of producing a hypoallergenic soy product from hypoallergenic soybean seeds which comprises:

15 (a) cracking the seeds of Claim 42 to remove the meats from the hulls; and  
(b) flaking the meats obtained in step (a) to obtain the desired flake thickness.

55. An isolated nucleic acid fragment comprising a nucleic acid sequence encoding a soybean Gly m 2 protein.

56. An isolated nucleic acid fragment comprising a nucleic acid sequence encoding a soybean Gly m 2 protein with an amino acid identity of 95% or greater to the polypeptide sequence set forth in SEQ ID NO:6 or a functionally equivalent subfragment thereof.

57. The isolated nucleic acid fragment of Claim 56 wherein the amino acid identity is 95% or greater to the polypeptide sequence set forth in SEQ ID NO:6.

58. A plant Gly m 2 protein having an amino acid identity of 95% or greater to the polypeptide sequence set forth in SEQ ID NO:6.

59. A chimeric gene comprising the nucleic acid fragment of Claim 55, 56, 57 or 58 or the reverse complement thereof operably linked to regulatory sequences.

60. A hypoallergenic soybean plant comprising in its genome the chimeric gene of Claim 59.

30 61. Seeds of the plant of Claim 60.

62. Oil obtained from the seeds of Claim 61.

63. A hypoallergenic soybean product obtained from the plant of Claim 60.

64. The product of Claim 63 wherein said soybean product is selected from the group consisting of an isolate, a concentrate, meal, grits, full fat and defatted flours, textured proteins, textured flours, textured concentrates and textured isolates.

35 65. A food which has incorporated therein the product of Claim 63 or 64.

66. A food which has incorporated therein the oil of Claim 62.

67. Products made from the hydrogenation, fractionation, interesterification or hydrolysis of the oil of Claim 62.

68. A blended oil product made with the oil of Claim 62.

69. By-products made during the production of the oil of Claim 43.

5 70. Animal feed which has incorporated therein the product of Claim 63 or 64.

71. Animal feed which has incorporated therein the oil of Claim 62.

72. Infant formula which has incorporated therein the product of Claim 44 or 45.

73. A method of producing a hypoallergenic soy product from hypoallergenic soybean seeds which comprises:

10 (a) cracking the seeds of Claim 61 to remove the meats from the hulls; and  
(b) flaking the meats obtained in step (a) to obtain the desired flake thickness.

74. A recombinant expression construct to lower Gly m IA content of a soybean wherein which comprises a promoter operably linked to an isolated Gly m IA nucleic acid fragment corresponding substantially to the nucleotide sequence set forth in SEQ ID NO:9 or a functionally equivalent subfragment thereof.

15 75. A recombinant expression construct to lower Gly m IB content of a soybean which comprises a promoter operably linked to an isolated Gly m IB nucleic acid fragment corresponding substantially to the nucleotide sequence set forth in SEQ ID NO:9 or a functionally equivalent subfragment thereof.

20 76. A recombinant expression construct to lower rGLY m3 content of a soybean wherein which comprises a promoter operably linked to an isolated rGly m3 nucleic acid fragment corresponding substantially to the nucleotide sequence set forth in SEQ ID NOs:11 and 13 or a functionally equivalent subfragment thereof.

25 77. A recombinant expression construct to lower Glycinin G1 (AlaB1b) content of a soybean wherein which comprises a promoter operably linked to an isolated Glycinin G1 nucleic acid fragment corresponding substantially to the nucleotide sequence set forth in SEQ ID NO:15 or a functionally equivalent subfragment thereof.

78. A hypoallergenic soybean plant comprising in its genome at least one of the expression constructs of any of Claims 74, 75, 76 and 77.

30 79. Seeds of the plant of Claim 78.

80. Oil obtained from the seeds of Claim 79.

81. A hypoallergenic soybean product obtained from the plant of Claim 78.

82. The product of Claim 81 wherein said soybean product is selected from the group consisting of an isolate, a concentrate, meal, grits, full fat and defatted flours, textured proteins, textured flours, textured concentrates and textured isolates.

35 83. A food which has incorporated therein the product of Claim 81 or 82.

84. A food which has incorporated therein the oil of Claim 80.

85. Products made from the hydrogenation, fractionation, interesterification or hydrolysis of the oil of Claim 80.

86. A blended oil product made with the oil of Claim 80.

87. By-products made during the production of the oil of Claim 80.

5 88. A method of producing a hypoallergenic soy product from hypoallergenic soybean seeds which comprises:

- (a) cracking the seeds of Claim 79 to remove the meats from the hulls; and
- (b) flaking the meats obtained in step (a) to obtain the desired flake thickness.

89. Infant formula which has incorporated therein the product of Claim 81 or 82.

10 90. The by-product of Claims 15, 33, 50, 69 and 87 wherein the by-product is lecithin.